Forest Site Management Section
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July 8, 1997

SILVICULTURE NOTE 9

FINAL REPORT

SX TRIAL 89-204-Q

FERTILIZATION OF INTERIOR SPRUCE (SX) AT THE TIME OF SOWING ENGLAND CREEK, FOUR-YEAR RESULTS

Introduction

Fertilization at the time of sowing (FAS) has been considered one way of alleviating planting check of Sx. The technique has the advantage of being transparent to field operations, as the treatment is applied at the nursery months before the trees arrive at the site. This trial examines three different FAS fertilizers and four different application rates on the outplanting performance of Sx seedlings in central B.C.

Sites

The England Creek test site is located east of Prince George along the Willow River, in the Prince George Forest District (Figure 1). The site is in the Willow variant of the moist, cool Sub-Boreal Spruce biogeoclimatic zone (Table 1). The site was planted two years after site preparation. FAS was prescribed to offset the planting delay and avoid vegetation competition.

FIGURE 1. Location of England Creek FAS trial.

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FS 713-HFP 974

TABLE 1. Site conditions for England Creek FAS trial

Site conditions and history	
Biogeoclimatic zone	SBSwk1
Site series	(07) Sxw–Twinberry–Oak fern (01) Sxw Oak fern
Moisture/Nutrient regime	4D/ 4C
Logged	1988
Site preparation	Broadcast burned 1988
Planted	1991

Species and Stock Type

Sx 4177 PSB 313B 2+0 spring-planted stock were used. Stock were planted in the spring of 1991. At planting, the seedlings without FAS averaged about 30 cm tall. Seedlings that received the FAS treatment were 5 cm taller, averaging 35 cm in height.

Treatments

There were five FAS treatments involved in the trial (Table 2). Although these treatments were regarded as long-term in 1989, many nurseries have since adopted some of these FAS schedules as routine operational practices to provide additional nutrients during nursery culture. The exact FAS recipes used vary depending upon nursery, species and crop cycle.

The application rate delivered to each seedling was less than 1% of the conventional broadcast fertilizer application rate of 32 g N/seedling recommended by Brockley (1988). All seedlings were fertilized in the nursery as well as receiving the FAS treatment. The products used each have different release characteristics and different forms of N. Osmocote™ is a ammonia-N fertilizer with a hard resin coating that releases the fertilizer by rupturing. Nutricote™ is a nitrate-N fertilizer with a soft resin coating through which the fertilizer dissolves. Woodace ™ is an isobutylidene diurea (IBDU) N-source tablet that, upon release, dissolves into both nitrate- and ammoniacal-N. Release of fertilizer for all of these products is mediated by moisture and temperature. The duration is the length of time that the fertilizer takes to leave the prill, not the length of time it takes before the fertilizer is initially released. Fertilizer is released immediately upon planting. The expected duration of release is determined under laboratory conditions for specific temperatures and moisture content.

Results

All seedlings, regardless of fertilization treatment, displayed planting check in their first and second growing season growing less than 10 cm over the two-year period.

Survival

For this site, survival was poor due to heavy grass competition that proliferated during the two-year planting delay. The average survival of the unfertilized treatment was 75% and the FAS treatments were similar to, or as low as 68% survival (Figure 2). Most mortality occurred in the first two years after planting. There were no statistically significant differences in survival between the unfertilized and the FAS treatments, nor were there any statistically significant differences between fertilizer treatments.

TABLE 2. FAS treatments used in England Creek FAS trial

Treatment	Fertilizer rate in nursery (kg/m³)	Formulation	Duration (month)	Fertilizer rate (g/tree)	N rate (g N/tree)
Control					
Osmocote™	13	17-7-11	12	0.85	0.11
Osmocote™	20	17-7-11	12	1.30	0.23
Nutricote™	14.6	14-14-14	12	0.95	0.13
Nutricote™	20	14-14-14	12	1.30	0.18
Woodace™	11	20-4-11	8–9	0.72	0.14

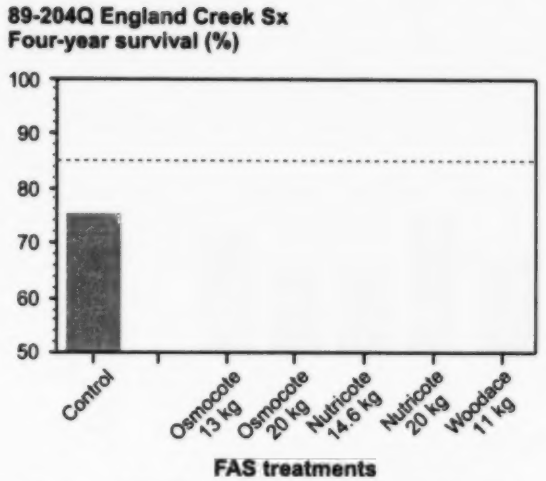

FIGURE 2. Fourth-year survival of FAS treatment combinations at England Creek. The horizontal line at 85% is a reference line of silviculturally acceptable survival.

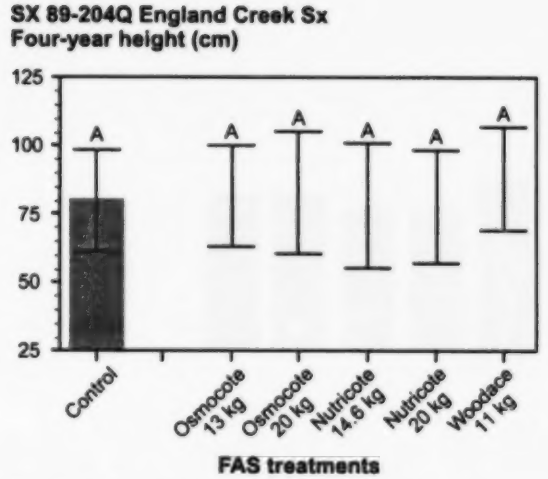

FIGURE 3. Fourth-year total height growth and standard error of the mean for different FAS treatment combinations at England Creek. Treatment means marked with the same letter are not considered statistically significantly different at a probability of 5%. The error bar about the mean four-year height is the standard error of the mean.

Height Growth

Although the initial growth was poor and the survival was poor, the total height growth after four years was good, primarily due to the third and fourth year height increments. Most treatments averaged 80 cm in height with a number of seedlings being over 1 m tall after just four years (Figure 3). There were no statistically significant differences between the FAS treatments and the unfertilized control. Any apparent difference between the FAS treatments occurred in the third and fourth years following planting. The FAS treatments were slightly more variable than the unfertilized control, possibly due to differences in the amount of fertilizer incorporated at sowing. There were also no statistically significant differences between FAS treatment. Seedlings treated with Osmocote™ and Woodace™ tended to be slightly larger than the Nutricote™-treated seedlings, possibly as a result of the ammoniacal N-sources and fertilizer release characteristics. The general trend of the Woodace™-treated seedlings being the best treatment and the Nutricote™-treated seedlings having the least height growth is also evident for Pli and Sx in other FAS trials reported here.

Conclusions and Recommendations

FAS provided no benefit to alleviating planting check, improving survival, or increasing height growth under these site conditions. The fertilizers used in this study were only rated as a 12-month duration under warm, moist nursery cultural conditions. Due to the release duration, and the very small applications rates used in a two-year crop cycle, it is unlikely that there was any additional significant amount of fertilizer left at planting. The observed small differences in height growth may be due to a carry-over nursery effect (i.e., better bud development at the nursery), rather than the persistence of fertilizer.